

CLAIMS

We claim:

1. A method of making a purified kettle hop essence and flavorant, comprising:

extracting hops with an aqueous alcohol to produce an extract containing polar, water soluble
5 compounds;

concentrating the extract with respect to the polar, water soluble compounds; and

purifying the concentrated extract with respect to kettle hop essences and flavorants to produce the purified kettle hop essence and flavorant.

2. The method of claim 1, wherein the ratio of hops to aqueous alcohol is 1:1 to 1:100 w/v.

3. The method of claim 1, wherein the hops are hop solids.

4. The method of claim 1, wherein the aqueous alcohol contains 0.1% to 100% v/v water.

5. The method of claim 1, wherein the alcohol is ethanol.

6. The method of claim 1, wherein the concentrating step is accomplished by evaporation.

7. The method of claim 1, wherein the purifying step is accomplished by the steps of (a) feeding the extract to a liquid chromatography column having a packing material selected from the group consisting of
5 polymeric resins, activated carbon, molecular sieves, silica gels, derivatized silica gels, celluloses, and derivatized celluloses whereby kettle hop essences and flavorants are retained on the packing material; (b)
10 eluting the kettle hop essences and flavorants from the packing material to obtain an eluent containing the compounds; and (c) further concentrating the compounds in the eluent by evaporation.

8. The method of claim 7, wherein the kettle hop essences and flavorants are glycosides.

9. The method of claim 8, comprising the further step of converting at least some of the glycosides to aglycones by breaking the attachment of the sugar moiety to the aglycone.

10. The method of claim 8, comprising the further step of adding at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids to the purified kettle hop essence and flavorant.

11. The method of claim 9, comprising the further step of adding at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids to the purified kettle hop essence and flavorant.

12. The method of claim 9, wherein the converting step is accomplished in the presence of enzymes which are selected for their ability to break the attachment of the sugar moiety to the aglycone.

13. The method of claim 9, wherein the converting step is accomplished by fermentation in the presence of yeast and model wort.

14. The method of claim 9, wherein the converting step is accomplished by fermentation in the presence of yeast and wort.

15. The method of claim 9, wherein the converting step is accomplished by acid hydrolysis.

16. The method of claim 1, wherein the purifying step is accomplished by the steps of (a) feeding the extract to a membrane process selected from the group consisting of filtration, reverse osmosis,
5 ultrafiltration, size-exclusion, dialysis, electro-dialysis, and osmosis whereby the kettle hop essences and flavorants are retained in a retentate and (b) further concentrating the compounds in the retentate by evaporation.

17. The method of claim 16, wherein the kettle hop essences and flavorants are glycosides.

18. The method of claim 17, comprising the further step of converting at least some of the glycosides to aglycones by breaking the attachment of the sugar moiety to the aglycone.

19. The method of claim 17, comprising the further step of adding at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids to the purified kettle hop essence and flavorant.

20. The method of claim 18, comprising the further step of adding at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids to the purified kettle hop essence and flavorant.

21. The method of claim 18, wherein the converting step is accomplished in the presence of enzymes which are selected for their ability to break the attachment of the sugar moiety to the aglycone.

22. The method of claim 18, wherein the converting step is accomplished by fermentation in the presence of yeast and model wort.

23. The method of claim 18, wherein the converting step is accomplished by fermentation in the presence of yeast and wort.

24. The method of claim 18, wherein the converting step is accomplished by acid hydrolysis.

25. A kettle hop essence and flavorant comprising a purified aqueous lower alcohol extract of hops which has been purified with respect to kettle hop essences and flavorants.

26. The essence and flavorant of claim 25, wherein the hops are hop solids.

27. The essence and flavorant of claim 25, wherein the kettle hop essences and flavorants are glycosides.

28. The essence and flavorant of claim 26, further comprising at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids.

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~~29. A kettle hop essence and flavorant comprising a purified and converted aqueous alcohol extract of hops which has been purified with respect to glycosides and then at least partially converted by breaking the attachment of the sugar moiety to the aglycone molecule.~~

~~30. The essence and flavorant of claim 29, wherein the hops are hop solids.~~

~~31. The essence and flavorant of claim 30, further comprising at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids.~~

32. A method of making kettle hop flavored beverages from a fermentable growth media comprising the steps of:

fermenting the media; and

5 adding to the fermented media the essence and flavorant of claim 29 to form the kettle hop flavored beverage.

33. A method of making kettle hop flavored beverages from a fermentable growth media comprising the steps of:

- fermenting the media; and
- 5 adding to the fermented media the essence and flavorant of claim 25 to form the kettle hop flavored beverage.

34. The method of claim 32, further comprising the step of adding at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids.

35. A method of making a kettle hop flavored beverage from a fermentable growth media comprising the steps of:

- adding to the media, prior to fermentation, the
- 5 essence and flavorant of claim 25; and
- fermenting the media to form the kettle hop flavored beverage.

36. The method of claim 35, further comprising the step of adding at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids.

37. A kettle hop flavored beverage prepared by the method of claim 32.

38. A kettle hop flavored beverage prepared by the method of claim 35.

39. A kettle hop flavored beverage prepared by the method of claim 33.

40. A kettle hop essence and flavorant comprising:
linalool, α -terpineol, ipsdienol, and geraniol.

41. The essence and flavorant of claim 40 in which
the essence and flavorant is synthetically produced and
substantially pure.

42. A kettle hop essence and flavorant comprising:
glycosides of linalool, α -terpineol, ipsdienol,
and geraniol.

43. The essence and flavorant of claim 42 in which
the essence and flavorant is synthetically produced and
substantially pure.

44. A method of making a purified kettle hop essence and flavorant comprising:

- extracting hops with an aqueous alcohol to produce an extract containing polar, water soluble compounds;
- concentrating the extract with respect to the polar, water soluble compounds; and
- purifying the concentrated extract by removing at least a portion of free carbohydrates and inorganic salts to produce the purified kettle hop essence and flavorant.

45. The method of claim 44, wherein the ratio of hops to aqueous alcohol is 1:1 to 1:100 w/v.

46. The method of claim 44, wherein the hops are hop solids.

47. The method of claim 44, wherein the aqueous alcohol contains 0.1% to 100% v/v water.

48. The method of claim 44, wherein the alcohol is ethanol.

49. The method of claim 44, wherein the concentrating step is accomplished by evaporation.

50. The method of claim 44, wherein the purifying step is accomplished by the steps of (a) feeding the extract to a liquid chromatography column having a packing material selected from the group consisting of
5 polymeric resins, activated carbon, molecular sieves, silica gels, derivatized silica gels, celluloses, and derivatized celluloses whereby the free carbohydrates and inorganic salts in the extract are not retained by the packing material and kettle hop essences and flavorants
10 are retained on the packing material; (b) eluting the kettle hop essences and flavorants from the packing material to obtain an eluent containing the retained compounds; and (c) further concentrating the retained compounds in the eluent by evaporation.

51. The method of claim 50, wherein the kettle hop essences and flavorants are glycosides.

52. The method of claim 49, comprising the further step of converting at least some of the glycosides to aglycones by breaking the attachment of the sugar moiety to the aglycone.

53. The method of claim 51, comprising the further step of adding at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids to the purified kettle hop essence and flavorant.

54. The method of claim 52, comprising the further step of adding at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids to the purified kettle hop essence and flavorant.

55. The method of claim 52, wherein the converting step is accomplished in the presence of enzymes which are selected for their ability to break the attachment of the sugar moiety to the aglycone.

56. The method of claim 52, wherein the converting step is accomplished by fermentation in the presence of yeast and model wort.

57. The method of claim 52, wherein the converting step is accomplished by fermentation in the presence of yeast and wort.

58. The method of claim 52, wherein the converting step is accomplished by acid hydrolysis.

59. The method of claim 44, wherein the purifying step is accomplished by the steps of (a) feeding the extract to a membrane process selected from the group consisting of filtration, reverse osmosis, ultrafiltration, size-exclusion, dialysis, electro-dialysis, and osmosis whereby the free carbohydrates and inorganic salts are removed in the permeate and kettle hop essences and flavorants are retained in the retentate (b) further concentrating the compounds in the retentate by evaporation.

60. The method of claim 59, wherein the kettle hop essences and flavorants are glycosides.

61. The method of claim 60, comprising the further step of converting at least some of the glycosides to aglycones by breaking the attachment of the sugar moiety to the aglycone.

62. The method of claim 60, comprising the further step of adding at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids to the purified kettle hop essence and flavorant.

63. The method of claim 61, comprising the further step of adding at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids to the purified kettle hop essence and flavorant.

64. The method of claim 61, wherein the converting step is accomplished in the presence of enzymes which are selected for their ability to break the attachment of the sugar moiety to the aglycone.

65. The method of claim 61, wherein the converting step is accomplished by fermentation in the presence of yeast and model wort.

66. The method of claim 61, wherein the converting step is accomplished by fermentation in the presence of yeast and wort.

67. The method of claim 61, wherein the converting step is accomplished by acid hydrolysis.

68. A kettle hop essence and flavorant comprising a purified aqueous alcohol extract of hops in which kettle hop essences and flavorants have been purified by removing at least a portion of free carbohydrates and inorganic salts.

69. The essence and flavorant of claim 68, wherein the hops are hop solids.

70. The essence and flavorant of claim 68, wherein the kettle hop essences and flavorants are glycosides.

71. The essence and flavorant of claim 69, further comprising at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids.

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72. A kettle hop essence and flavorant comprising a purified and converted aqueous alcohol extract of hops which has been purified by with respect to glycosides by removing at least a portion of free carbohydrates and
5 inorganic salts and then at least partially converted by breaking the attachment of the sugar moiety to the aglycone molecule.

73. The ~~essence~~ and flavorant of claim 72, wherein the hops are hop solids.

74. The ~~essence~~ and flavorant of claim 73, further comprising at least one hop fraction selected from the group consisting of hop oil, iso- α -acids, dihydroiso- α -acids, tetrahydroiso- α -acids, and hexahydroiso- α -acids.

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